Grand Prairie Area Demonstration Project

Project Description

October 2000

Project Purpose – To protect and preserve the Alluvial and Sparta Aquifers, to allow for continued irrigated agriculture in the Grand Prairie, and to provide waterfowl conservation benefits.

Major Project Features

- Optimum conservation and irrigation efficiency
  - Tailwater recovery systems, pipelines, pumps and other features to optimize conservation
  - Water management plan for farms
- Increase on-farm irrigation storage
  - Create an additional 88,000 acre-feet of storage
  - Approximately double existing storage in the project area
- Use the alluvial aquifer at its long term safe yield
  - Opportunity to eliminate use of Sparta Aquifer for agriculture and reserve for municipal and industrial use
- Import supplemental irrigation water
  - 1,640 cubic feet per second pumping station near DeVall's Bluff
  - Distribution system of canals, pipelines, and natural streams
- Provide over 38,000 acres of flooded rice fields for waterfowl
- Restore native prairie grasses
- Examining additional features for aquifer protection, waterfowl conservation, and other environmental benefits

What Will Happen Without The Project

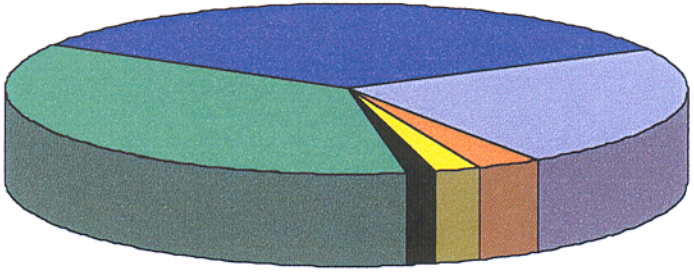
- The Alluvial aquifer will no longer be able to sustain irrigated agriculture by the year 2015.
- Rice production will drop to 23% of current levels and agriculture will switch to dry land soybean production.
- A high quality food source (rice) for waterfowl will be lost.
- The natural streams will continue to be depleted during the irrigation season.
- The aquifer's natural interaction with the wetlands and streams will be lost.
- Agriculture switching to Sparta aquifer which is the area drinking water aquifer.

Present (1996) and Projected Land Use Without-Project Conditions Grand Prairie Area Demonstration Project (Acres)

1996

Irrigated Cropland

(241,777 Acres)

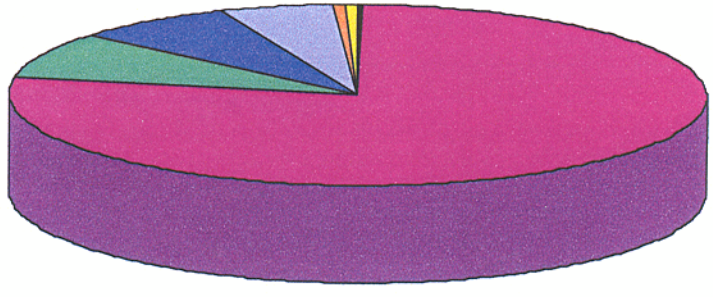


- Rice
- Soybeans Singles-Cropped
- Soybeans Double-Cropped
- Grain Sorghum
- Corn
- Aquaculture

2015

Irrigated Cropland

(54,648 Acres)



Dryland Cropland

(187,129 Acres)

- Rice
- Soybeans Singles-Cropped
- Soybeans Double-Cropped
- Grain Sorghum
- Corn
- Aquaculture
- Dryland Cropland

What Are The Consequences

- Decrease in farm receipts of $46 million or 47% of total receipts by the year 2015, assuming all current acres in production would remain in production.
- Decrease in irrigated cropland of 187,129 acres or 77% of current irrigated cropland by 2015.
- Less than 23% of current acreage in rice would remain in rice production.
- Farming operations capitalized for current conditions may not be able to adjust to shift.
- Decrease in land values.
- Inability to irrigate affects ability to borrow money for operations.
- Decrease in irrigation increases susceptibility to catastrophic drought.
- Decrease in land values affects tax base.
- Decrease in production impacts long term ability to sustain current local processing facilities.
- Decrease in production has secondary effects in employment, equipment sales and repair, and other agri-based business.
- Decrease in agribusiness impacts rest of economy.
- Economy must adjust to annual loss of $46 million in farm receipts.
- Fierce competition for surface water.
- Sparta aquifer will suffer rapid depletion as farmers use this aquifer for cropland irrigation.

Waterfowl Impacts

- Without the project, rice production would decrease by 77%. This means that a significant amount of high-quality waterfowl forage would disappear from the Grand Prairie.
- An estimated 17,400 acres of cropland is currently being managed for waterfowl.
- The project would flood 38,529 acres of harvested and rolled rice fields on an average annual basis, providing an additional 21,129 acres of managed cropland.
- The waterfowl feature would provide an additional 12,275,949 duck-use-days to the project area; a duck-use-day is defined as the capacity of available forage to meet the energy needs of one duck for one day.
- Shorebirds would also benefit from the flooded fields and newly constructed reservoirs.

- The Natural Resources Conservation Service would promote construction of sloped-bottom reservoirs to local farmers; this would benefit shorebirds by exposing additional mudflats during reservoir drawdowns.

Fisheries Impacts

- Studies conducted by recognized experts show the project will not negatively affect the White River fishery.

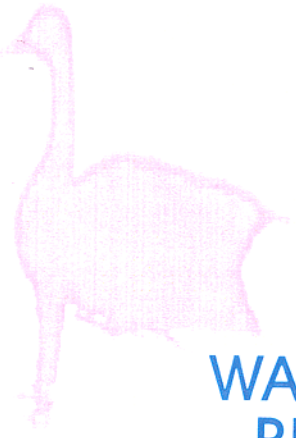
Wetland Impacts

- Project will not effect White River Flooding.
- A multi-agency team, led by the Arkansas Natural Heritage Commission and the Natural Resources Conservation Service with participation by the Arkansas Game and Fish Commission, U.S. Fish and Wildlife Service, Memphis District Corps of Engineers, and Arkansas Highway and Transportation Department, conducted a study to evaluate the impacts of water withdrawals from the Whiter River on wetlands and bottomland hardwood forest communities within the floodplain.
- The study revealed that project withdrawal impacts would be minimal during mid-summer and that flows under project withdrawal conditions appear to better approximate the "natural" or pre-reservoir conditions.
- The drying up (desiccation) of bottomland hardwoods along the White River that are influenced by groundwater could be either slowed or prevented.

Cumulative Impacts

- The Grand Prairie Project has minimal impacts and significant environmental benefits, and it is needed now to save the aquifer.
- Waiting to initiate construction would place the start of project operation dangerously close to the predicted depletion of the aquifer in 2015.

GRAND PRAIRIE AREA DEMONSTRATION PROJECT



WATERFOWL BENEFITS

*Without the project, rice production would decrease by 77%. This means that a significant amount of high quality waterfowl forage would disappear from the Grand Prairie.

*An estimated 17,400 acres of cropland is currently being managed for waterfowl.

*The project would flood 38,529 acres of harvested and rolled rice fields on an average annual basis, providing an additional 21,129 acres of managed cropland.

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*Shorebirds would also benefit from the flooded fields and newly constructed reservoirs.

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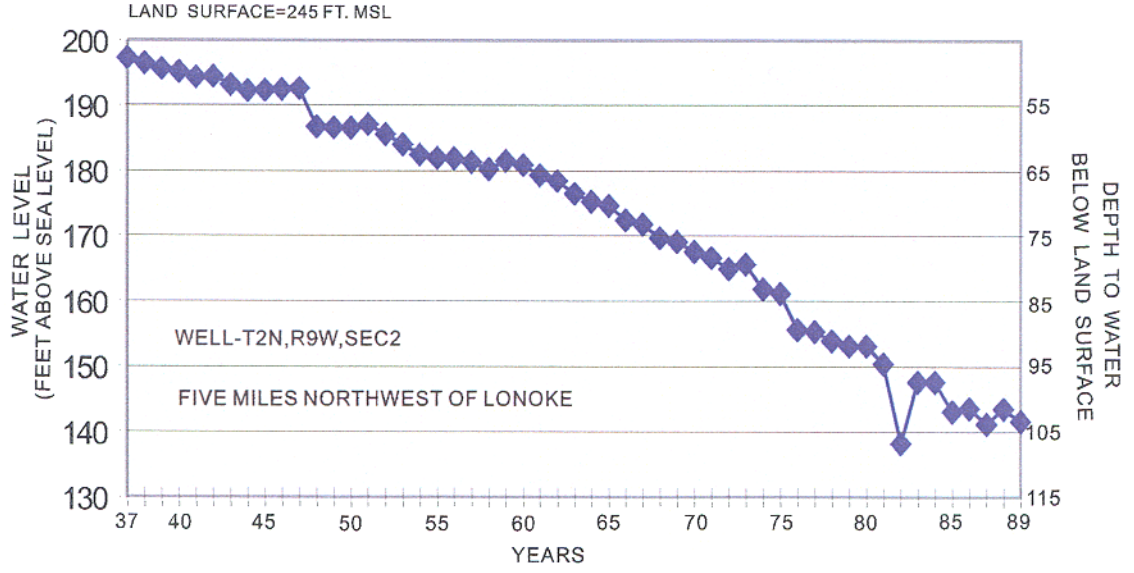
GRAND PRAIRIE
GROUNDWATER PROBLEMS

The Grand Prairie Region is located primarily in Arkansas, Lonoke and Prairie Counties of Eastern Arkansas. Historically, the Grand Prairie is bordered by the White River to the east, the Arkansas River on the West and Wattensaw to the North. Rice production began as early as 1904 in the area. The fairly level, treeless prairie, impermeable subsoil, abundant groundwater supplies, and tillable topsoil made the area ideal for rice production. More than 90% of the irrigation water was being withdrawn from the shallow Mississippi River Alluvial Aquifer. By 1915 more water was being withdrawn from the aquifer than was being recharged . This resulted in declines in the water table of the aquifer and a greater depth to water.

Rice production, groundwater overdraft and declines in the water table have continued to this day with a continual decrease in aquifer storage. This dewatering of the aquifer creates an unsaturated zone in the aquifer that is often referred to as a cone of depression. The cone of depression that resembles an elongated trough began around Stuttgart and DeWitt and has enlarged northward to encompass Hazen, Carlisle and Lonoke and is now moving onward toward England. The depth to water in this trough is over 120 feet in some locations. The change in the water table fluctuates seasonally with the irrigation season and the recharge season. The lowering of water levels has not been uniform over the Grand Prairie. Some areas in the Grand Prairie are yet to be seriously affected or inconvenienced by the lowering of water levels while others have been forced to drill deep wells into the Sparta Sand to have the dependable supply of irrigation water that rice requires. It should be apparent that as long as more water is withdrawn for irrigation than is recharged to the aquifer, the lowering of water levels in the future will continue.

MISSISSIPPI RIVER ALLUVIAL AQUIFER
SPRING WATER LEVELS



Prepared by the SOUTH CENTRAL WATER MANAGEMENT CENTER
OCTOBER 1997

Recharge to the aquifer is from several sources. Groundwater is being recharged by the White River on the eastern border, the Arkansas River to the west and south, and from the northern border, (Fall line or Wattensaw Bayou). Approximately 15% or 18,400 acre feet per year is being recharged along the northern border, and 18% or 22,600 acre feet per year seeps through the clay cap and percolates down into the aquifer. The aquifer today relies on remote sources (Arkansas and White Rivers) for 67% of the total recharge or about 83,000 acre feet per year. Recharge is moving from all borders toward the trough of depression but recharge cannot keep up with groundwater usage. Recharge is variable, fluctuating with rainfall, river levels, acres of land flooded and withdrawals. The total recharge can also be thought of as the safe yield of an aquifer, or the quantity of water than can be withdrawn from the aquifer on an annual basis without a declining water table. The safe yield of the Grand Prairie has been estimated from as low as 38,000 acre feet per year to 140,000 acre feet per year. More commonly, safe yield estimates range from 115,000 to 137,000 acre feet per year. (more data on the safe yield will be available in mid 1997). Withdrawals from the aquifer in the Grand Prairie are approximately 400,000 acre feet per year. With a safe yield of 125,000 acre feet per year, overdraft of the aquifer is about 275,000 acre feet per year. This overdraft quantity is removed from storage in the aquifer annually and lower water levels is the result. As long as this imbalance continues, the lowering of water levels and loss of storage will continue to occur in the Grand Prairie.

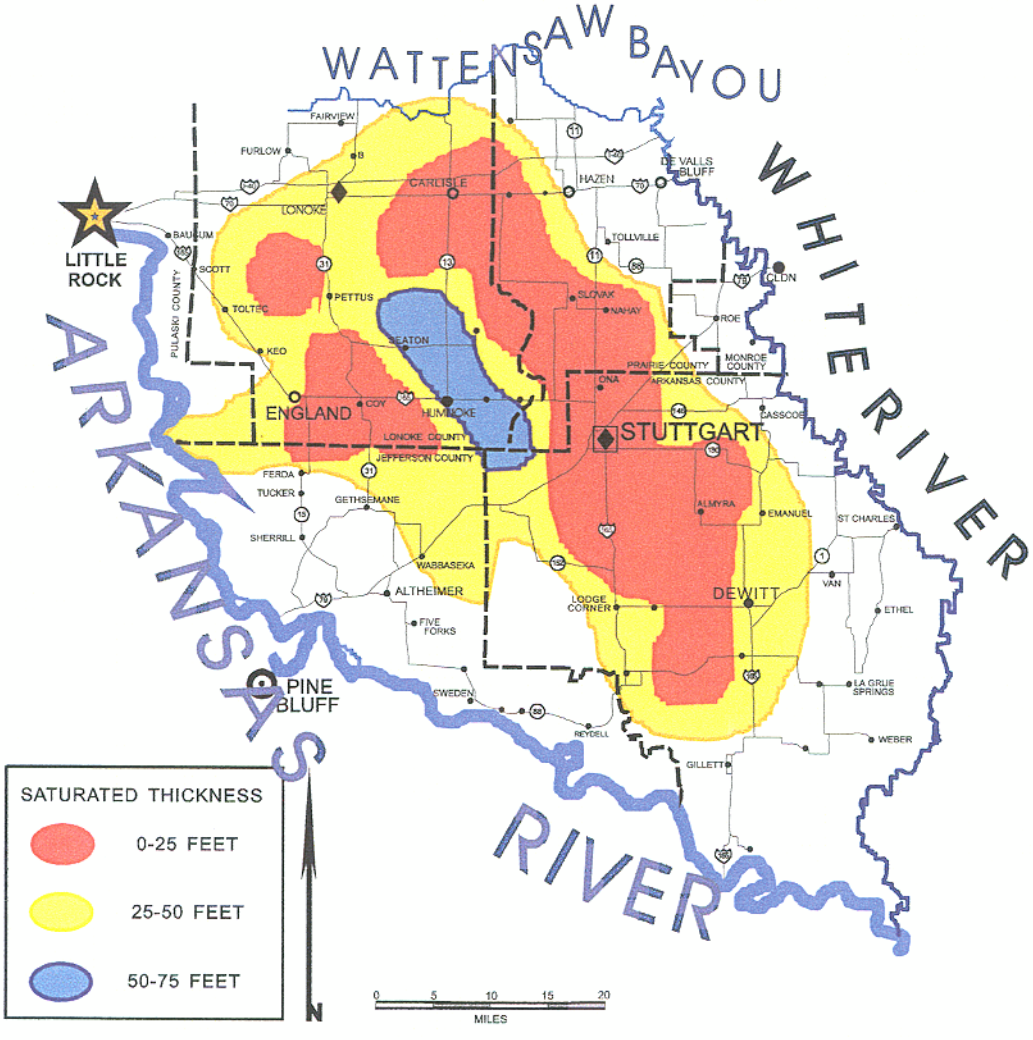
Areas within the Grand Prairie have low saturated thicknesses remaining. Water levels in the remaining waterbearing portions of the aquifer respond quickly to changes in the pumping pattern, cropping patterns, precipitation etc. Variability in water levels is expected. Some areas have a rebounding water table for a year or two and then experience a period of decline. Overall, the rate of decline will be *greatest* in those areas furthest from the recharge areas, (White, Arkansas, Wattensaw-Fall Line). The rate of decline will be the *least* in those areas adjacent to the White and Arkansas Rivers, Bayou Meto and Wattensaw Bayou. Storage will continue to decline in the aquifer. Estimates of current day storage amount to 16 million acre feet of water. Overdraft, or withdrawals exceeding recharge, amounts to 275,000 acre feet per year. However, the decrease in storage is not equal across the area, but varies greatly. Saturated thickness patterns are similar to the depth to water patterns. In the trough of depression, a broken band from 2 to 6 miles wide stretching from west of DeWitt to Hazen has less than 20 feet of aquifer material that contains water, (spring 1992 data). A wider band (8 to 12 miles wide) from southwest of DeWitt to Hazen contains less than 50 % of the original aquifer thickness that is saturated which fits critical groundwater area criteria as defined by Arkansas Groundwater Law.

The future of the Grand Prairie for rice production with current water resources does not look good. Projections for the area show large areas with less than 20 feet saturated thickness. A large band (8 to 15 miles wide) from south of DeWitt to Carlisle and Hazen is depicted as having less than 20 feet saturated aquifer by the year 2020. The area shown will not be able to support withdrawals for rice irrigation from the alluvial aquifer.

In recent years, the Sparta Sand has been referred to as the long term groundwater alternative to the Mississippi River Alluvial Aquifer, however, nothing could be further from the truth. Most public water supply systems rely on the Sparta Sand for drinking water and they have priority rights above irrigation in state law. The Sparta Sand Aquifer does not have the same hydrologic and hydraulic properties as the Mississippi River Alluvial Aquifer. The Sparta Sand has a specific yield of .01 compared to .30 for the alluvium. In other words, one foot of saturated aquifer material, one acre in size, from the alluvial aquifer contains 13,000 cubic feet of water. The Sparta Sand, for the same dimensions only contains 430 cubic feet of water. Declines in the water table (potentiometric surface) of the Sparta Sand Aquifer have already reached one foot per year for a five year period (1986-1993) in the Grand Prairie Region which exceeds the critical levels as defined by state law. Both, the Alluvial Aquifer and the Sparta Sand Aquifer fit the definition of "CRITICAL GROUNDWATER AREAS" by state law.

One alternative would be to increase recharge so more water could be withdrawn without declining water levels. Artificial recharge by the use of injection wells has been investigated over the decades with an intense effort in the 1950's. The main problem was clogging of the aquifer at the point of injection caused by; air entrainment, turbidity (silt) and microorganisms. Conclusions from these efforts were that water used for injecting back into an aquifer would have to be treated to drinking water standards to avoid the clogging problems. The cost of injected water was $50 per acre foot in 1962 dollars, and treatment costs accounted for 70% of total costs. Artificial recharge was not considered to be feasible, following this analysis.

MISSISSIPPI RIVER ALLUVIAL AQUIFER
PROJECTED SATURATED THICKNESS
YEAR 2022



SOURCE: MODIFIED FROM USGS PROFESSIONAL PAPER 1416-D
Prepared by the SOUTH CENTRAL WATER MANAGEMENT CENTER
SEPTEMBER 1997

Grand Prairie Irrigation Project White River Withdrawals

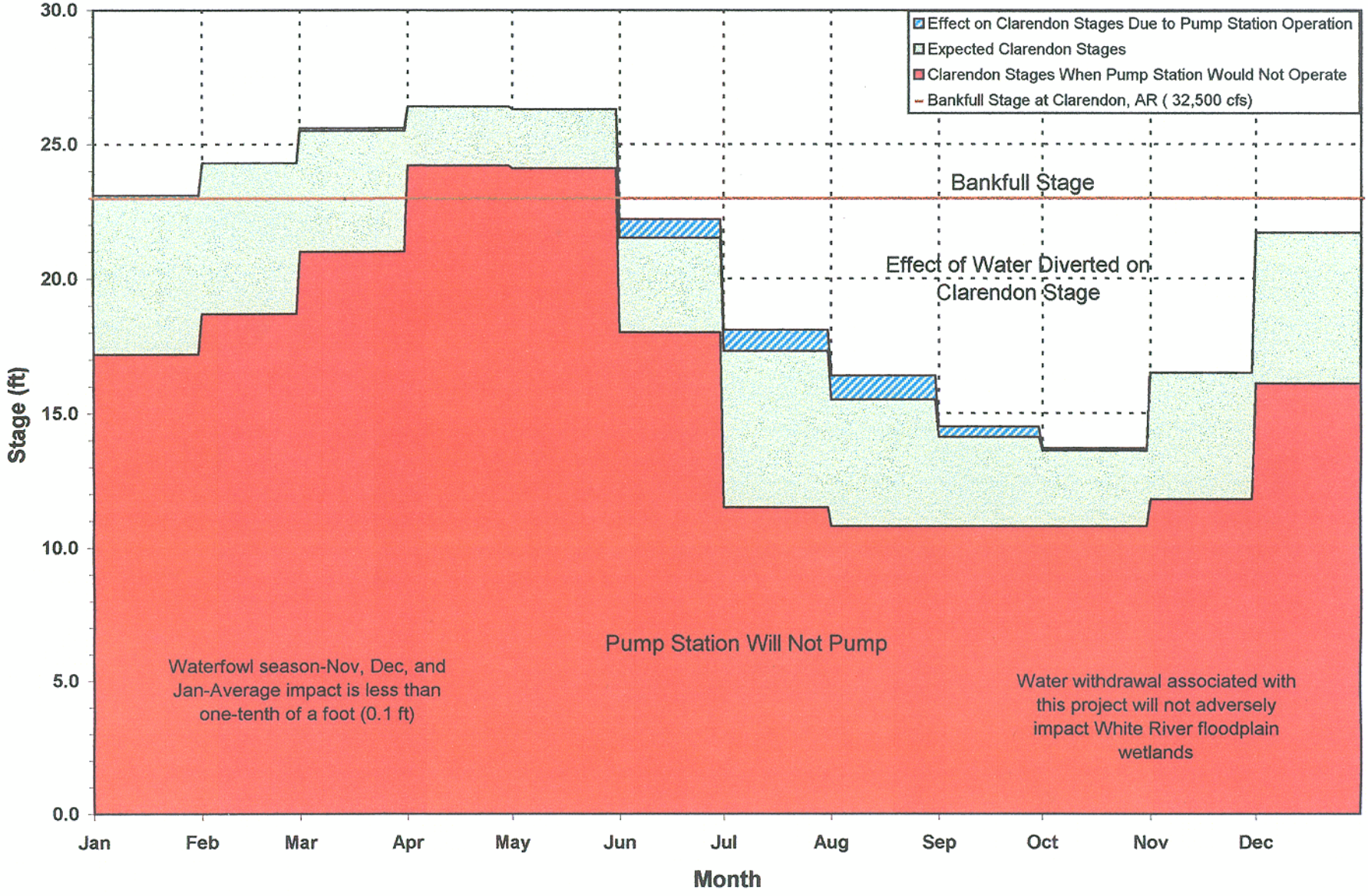
The withdrawals from the White River are governed by a plan developed by the state of Arkansas that establishes minimum stream flows, though this plan has not been established in law. The plan examined the minimum flows needs for water quality, fish and wildlife , and navigation for each month of the year. The requirement for water quality is 5,250 cubic feet per second (cfs) and the requirement for navigation is 9,650 cfs. The fish and wildlife minimum requirement ranges from a high of 36,940 cfs in April to a low of 6,920 cfs in October. The minimum stream flows were the highest of the minimum requirements. The project would only withdraw water above the minimum stream flow. The requirement for water quality never controls the cutoff because the minimum navigation and fish and wildlife requirements are always higher. The navigation requirement controls during August, September, and October. The following table provides the mean monthly flow at Clarendon and the corresponding gage reading along with the minimum instream flow and corresponding gage reading. The maximum capacity of the pumping station is 1,640 cfs, but the demand is usually much less. The average month demand is given in the next column and finally the effect of the demand on the mean monthly flow.

Grand Prairie Effects on the White River						
	Mean	Stage	Minimum	Stage	Average	Effect of Demand on
Month	Monthly Flow (cfs)	Clarendon Gage (Feet)	Instream Flow (cfs)	Clarendon Gage (Feet)	Monthly Demand (cfs)	Mean Monthly Stage (Feet)
January	32680	23.1	19610	17.2	277	0.1
February	37840	24.3	22700	18.7	279.3333	0
March	46010	25.6	27610	21	259.3333	0.1
April	52770	26.4	36940	24.2	389.6667	0
May	52340	26.3	36640	24.1	669.6667	0
June	30320	22.2	21220	18	1504.333	0.7
July	21340	18.1	10670	11.5	1638.333	0.8
August	18180	16.4	9650	10.8	1455.667	0.9
September	15040	14.5	9650	10.8	496.3333	0.4
October	13840	13.7	9650	10.8	58	0.1
November	18420	16.5	11050	11.8	22	0
December	29310	21.7	17590	16.1	0	0

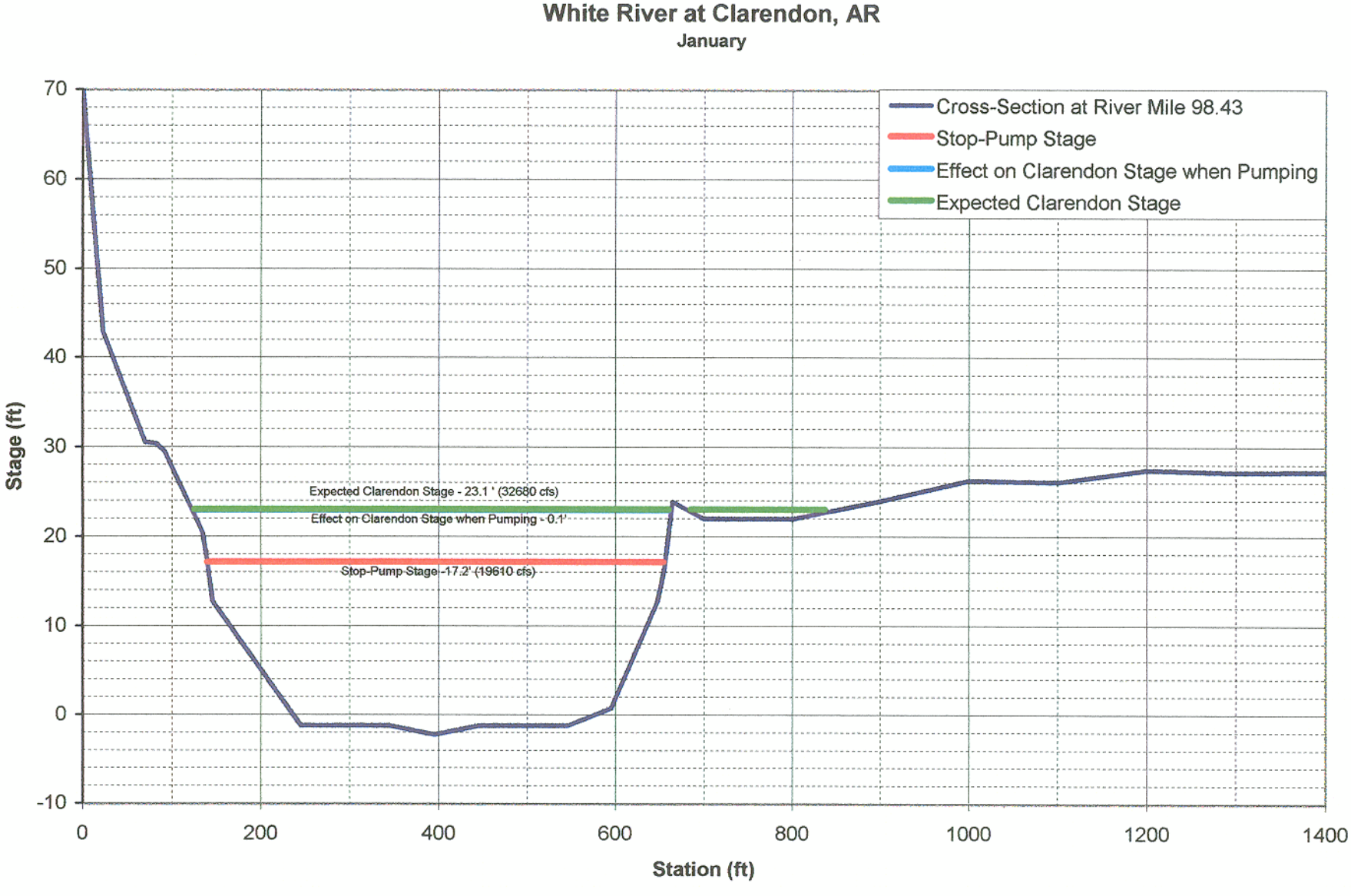
The chart on the next page graphically illustrates this with the red area being the stages when no pumping is allowed. The top of the green and blue area represents the mean annual stages with the blue representing the reduction on stages due to pumping to satisfy the demand. Withdrawals from the White River will have no measurable effect on flood flows.

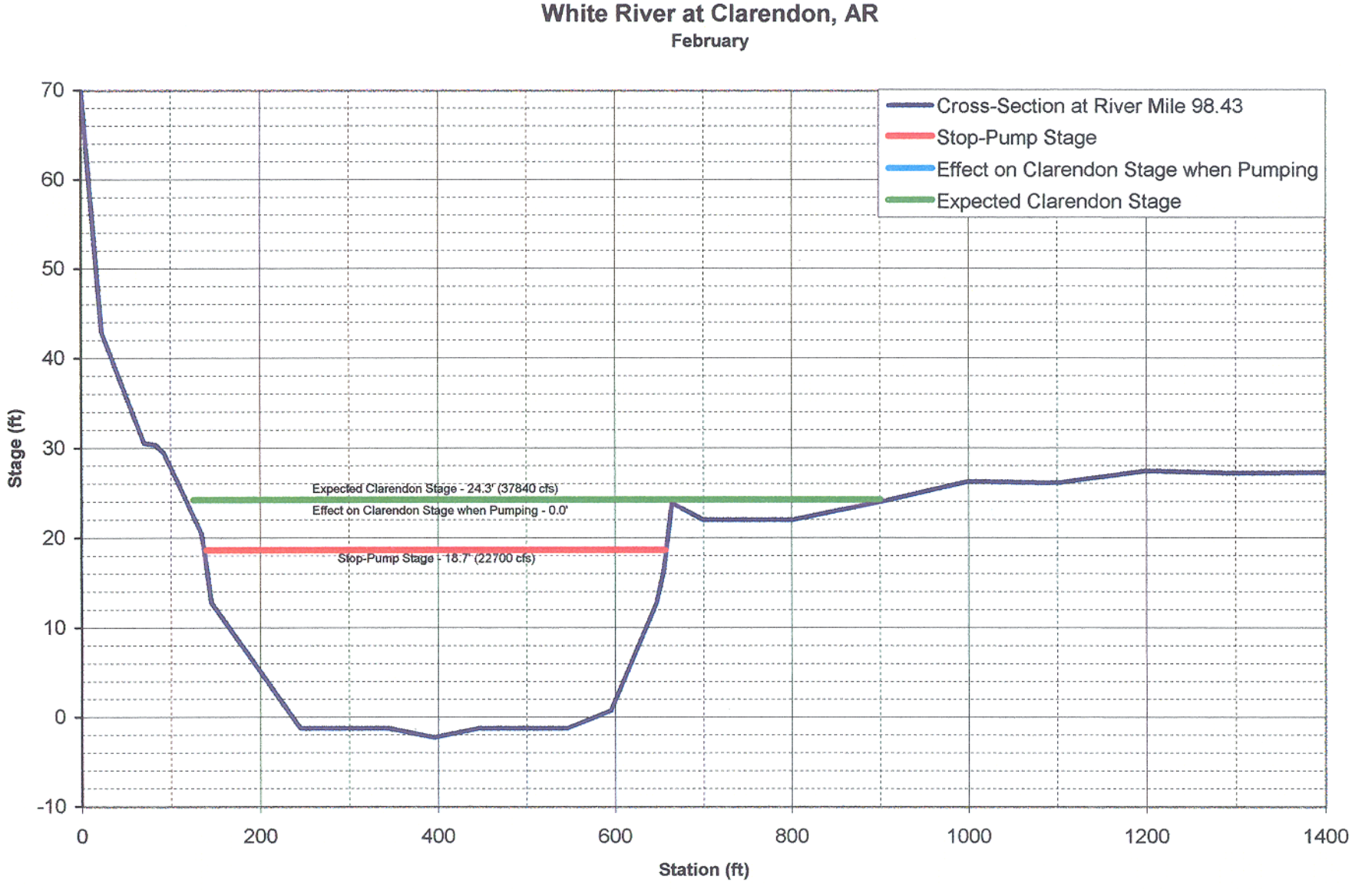
Clarendon Stages

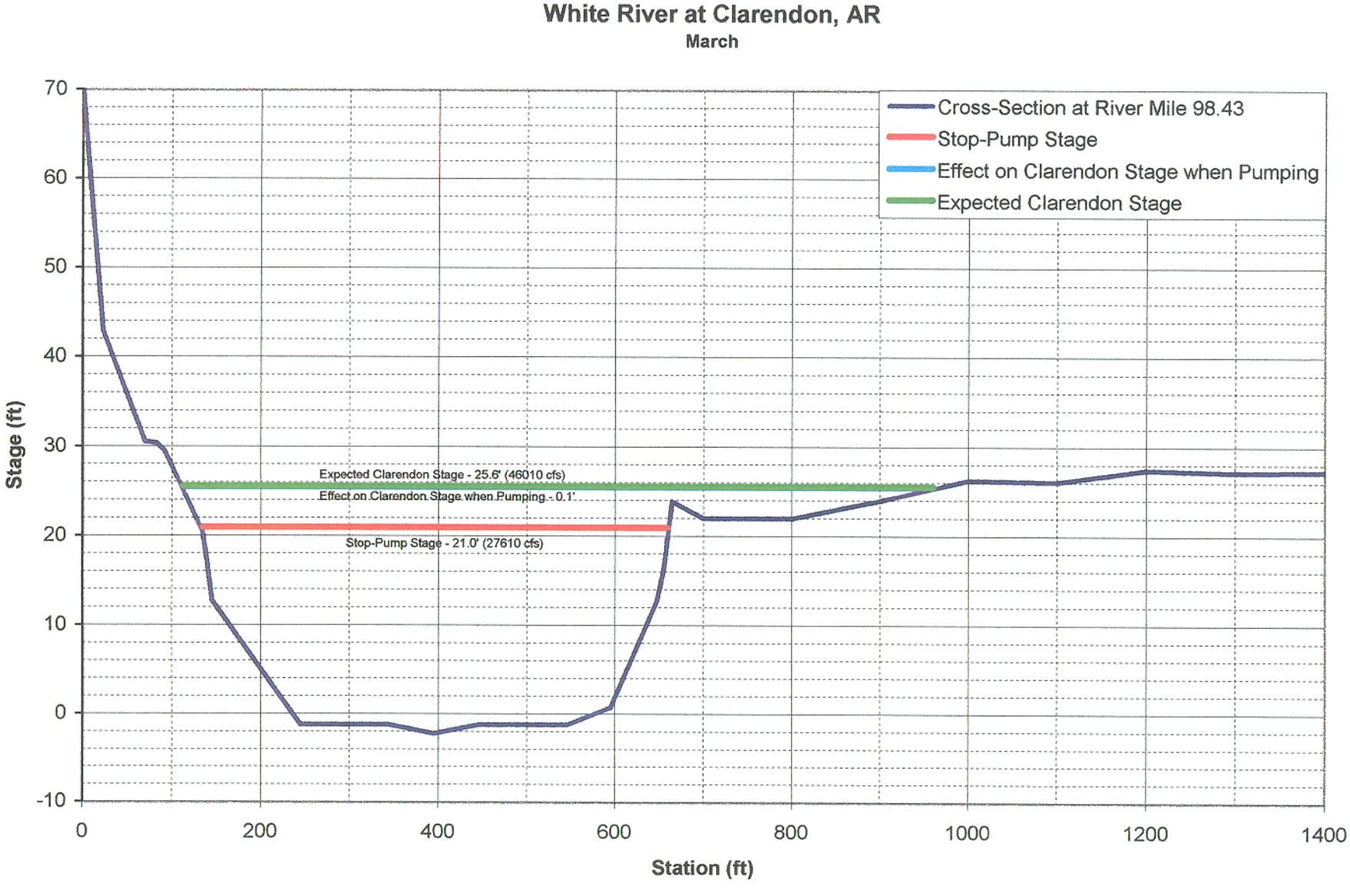
Based on White River Flow Information and Analyses

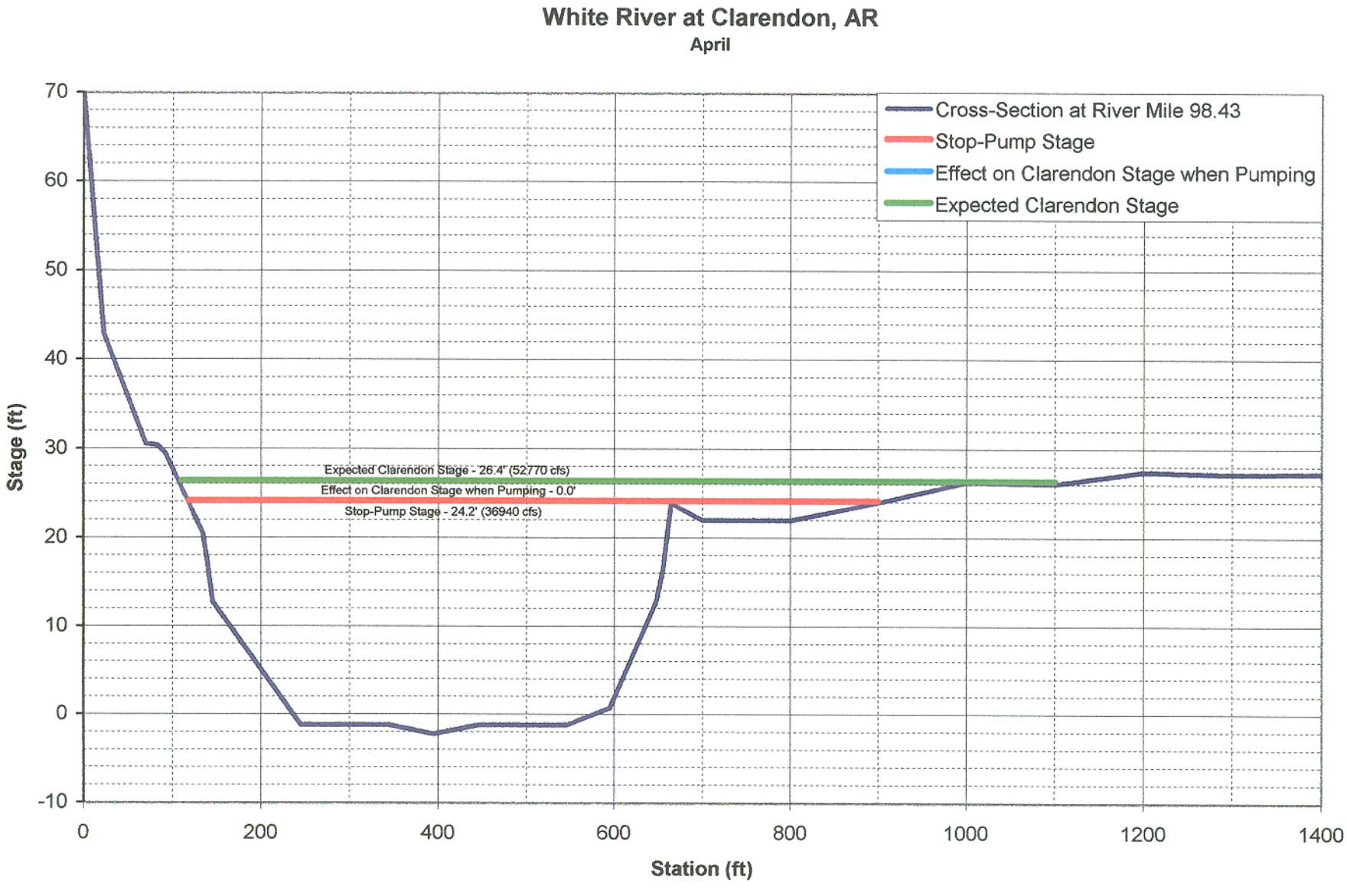


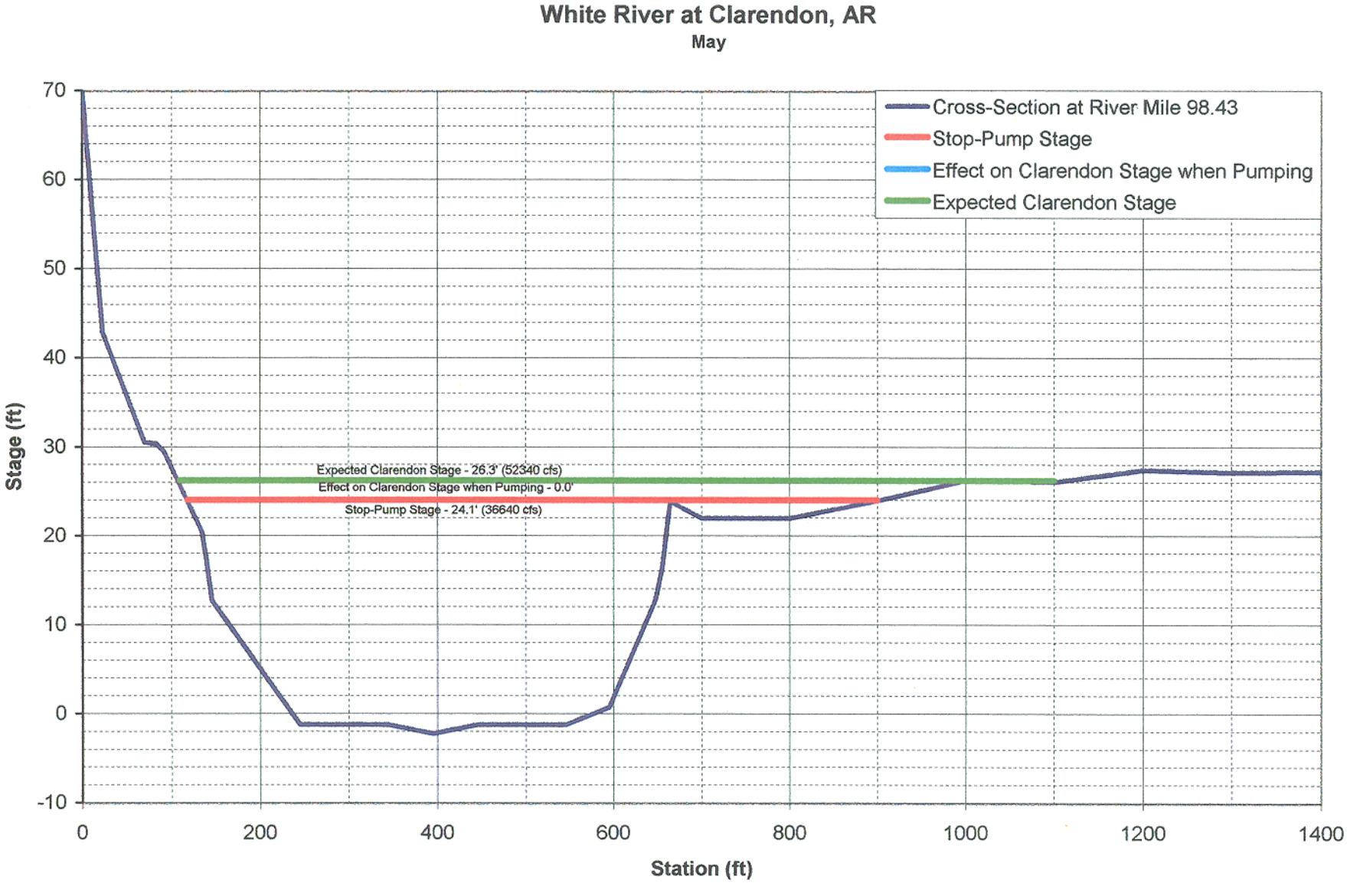
Changes in stages during summer months restore the in-bank flood hydrograph to pre-dam conditions

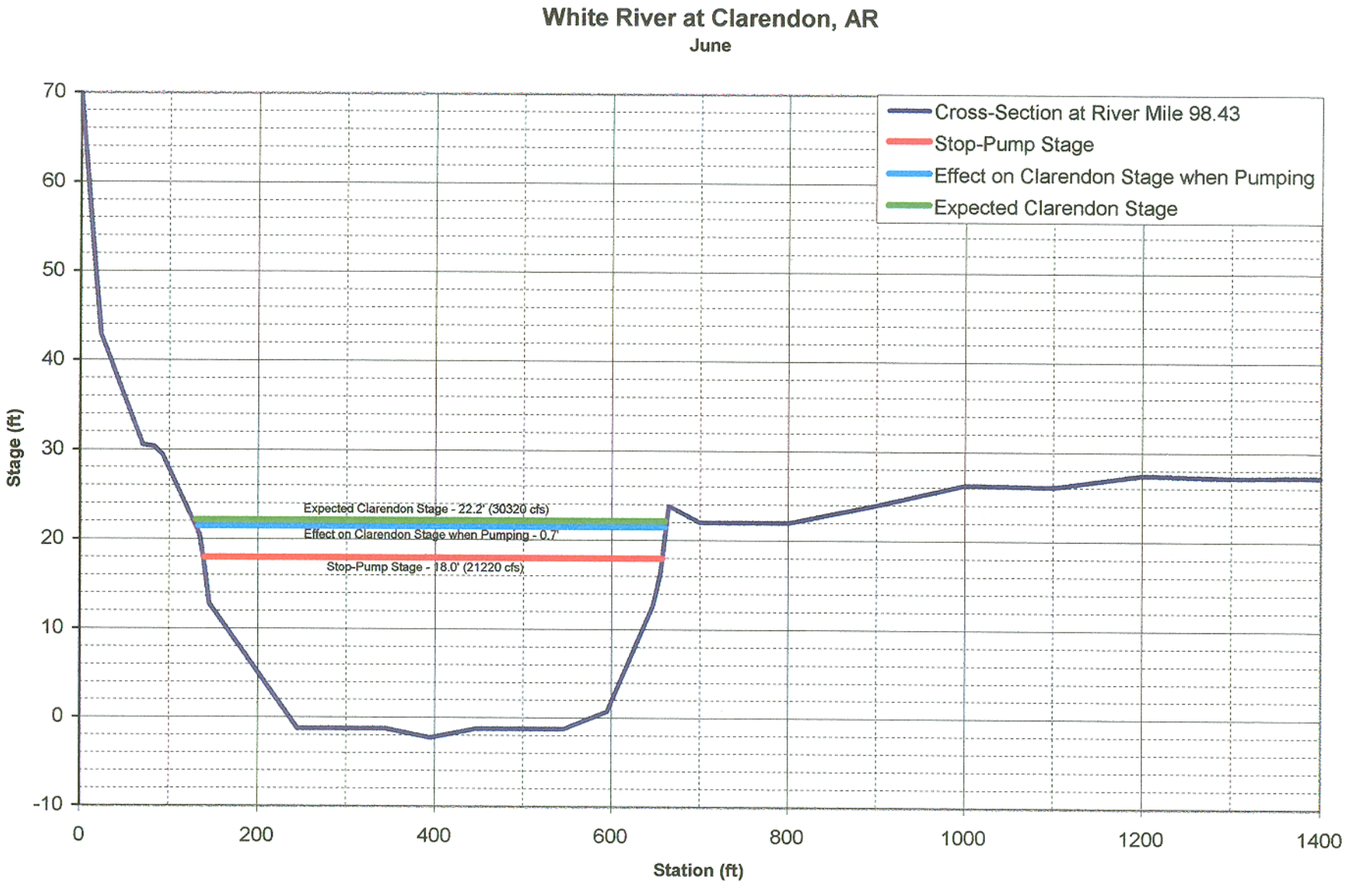

White River at Clarendon, AR
January
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 23.1 ' (32680 cfs)
Effect on Clarendon Stage when Pumping - 0.1'
Stop-Pump Stage -17.2' (19610 cfs)
Stage (ft)
Station (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400

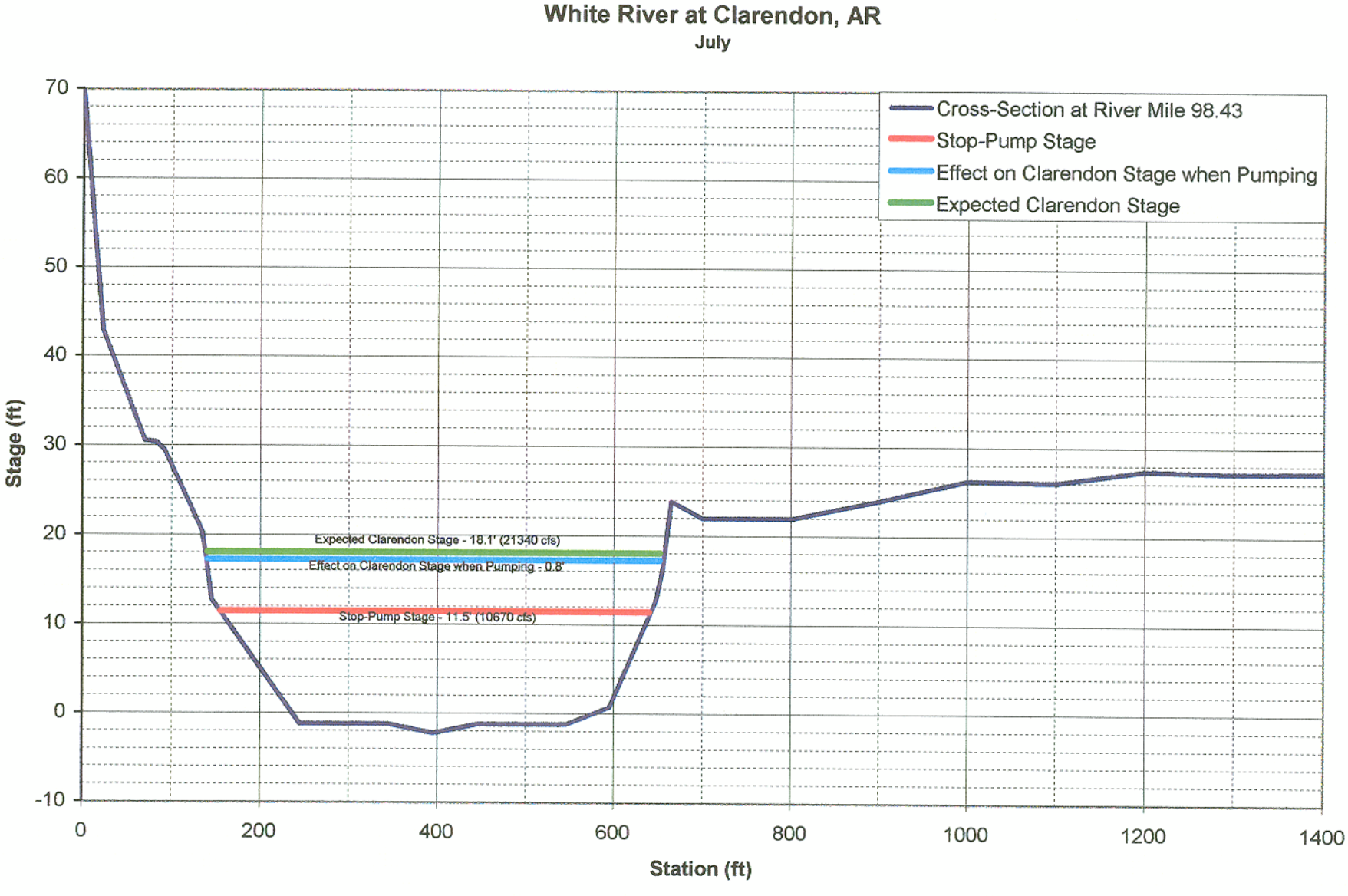

White River at Clarendon, AR
February
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 24.3' (37840 cfs)
Effect on Clarendon Stage when Pumping - 0.0'
Stop-Pump Stage - 18.7' (22700 cfs)
Stage (ft)
Station (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400

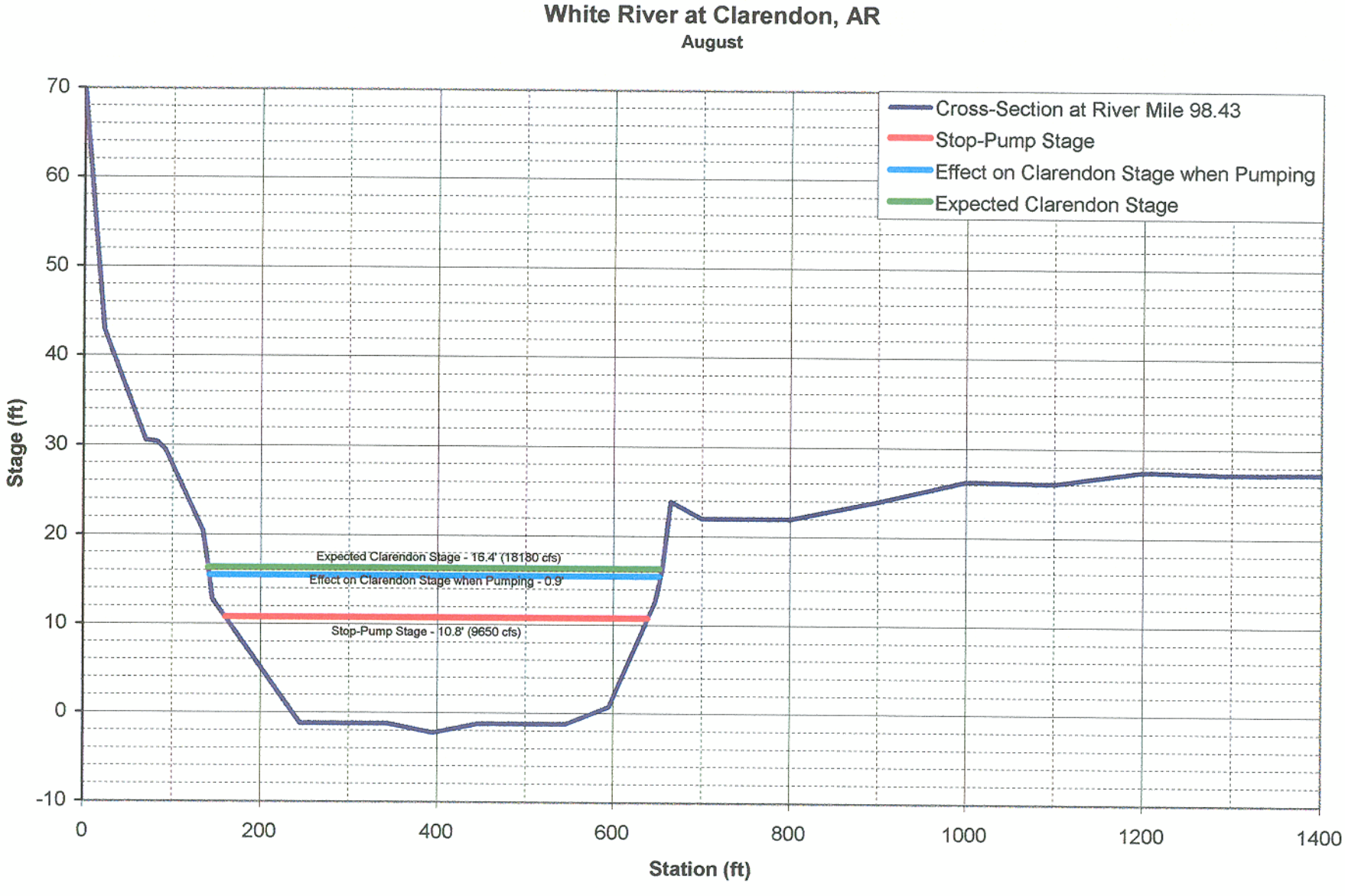

White River at Clarendon, AR
March
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 25.6' (46010 cfs)
Effect on Clarendon Stage when Pumping - 0.1'
Stop-Pump Stage - 21.0' (27610 cfs)
Stage (ft)
Station (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400

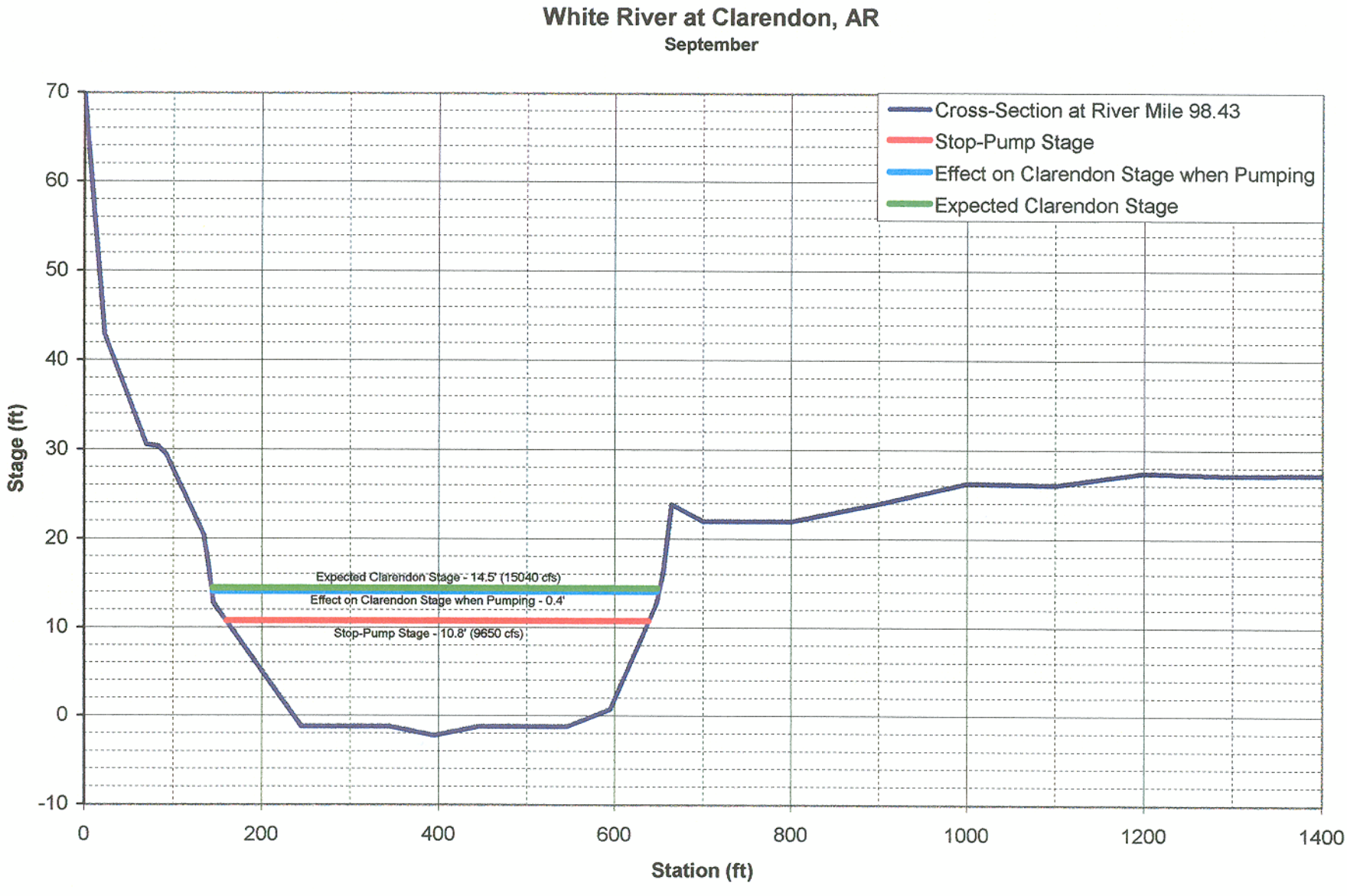

White River at Clarendon, AR
April
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 26.4' (52770 cfs)
Effect on Clarendon Stage when Pumping - 0.0'
Stop-Pump Stage - 24.2' (36940 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)

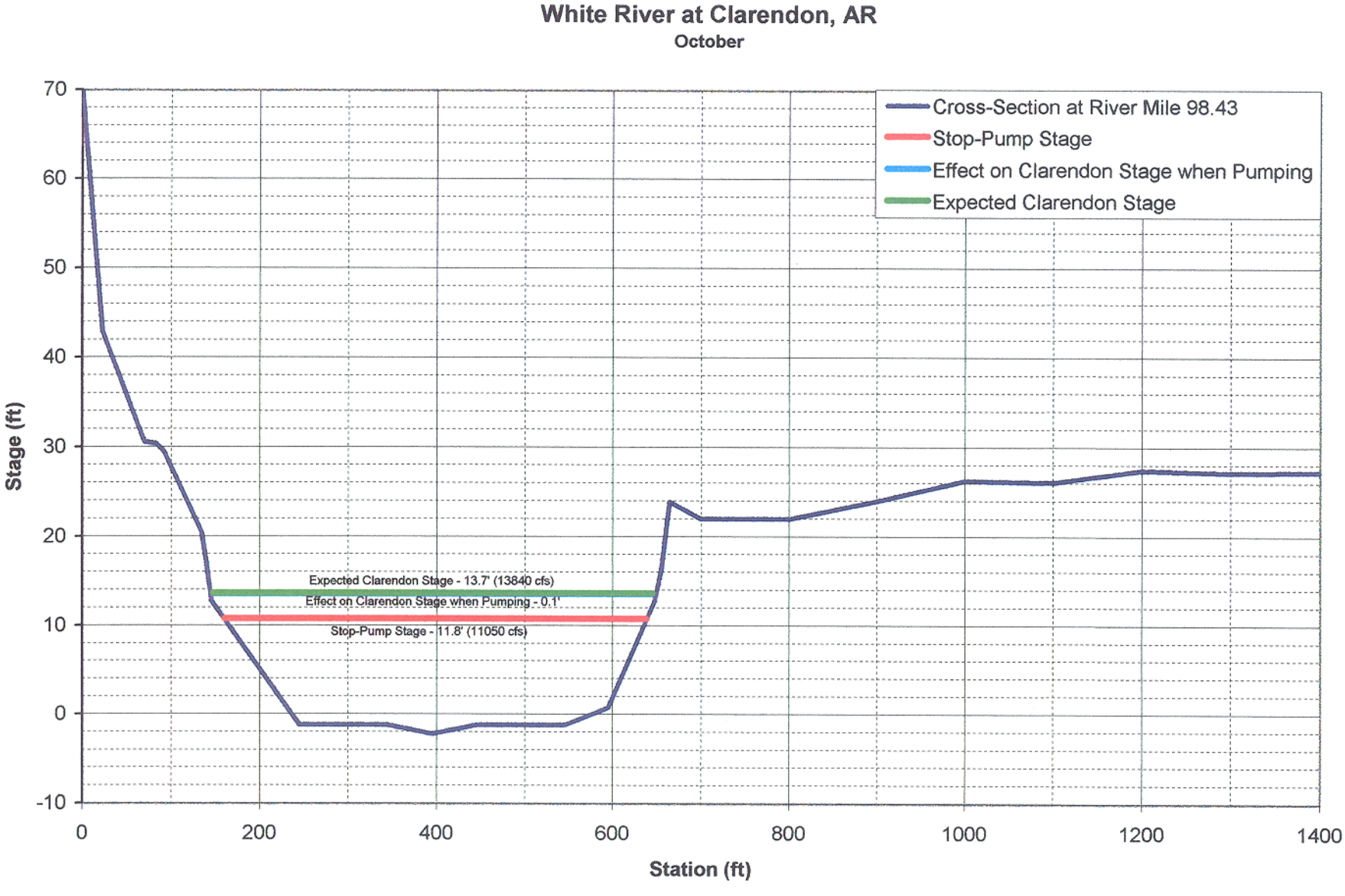

White River at Clarendon, AR
May
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 26.3' (52340 cfs)
Effect on Clarendon Stage when Pumping - 0.0'
Stop-Pump Stage - 24.1' (36640 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)

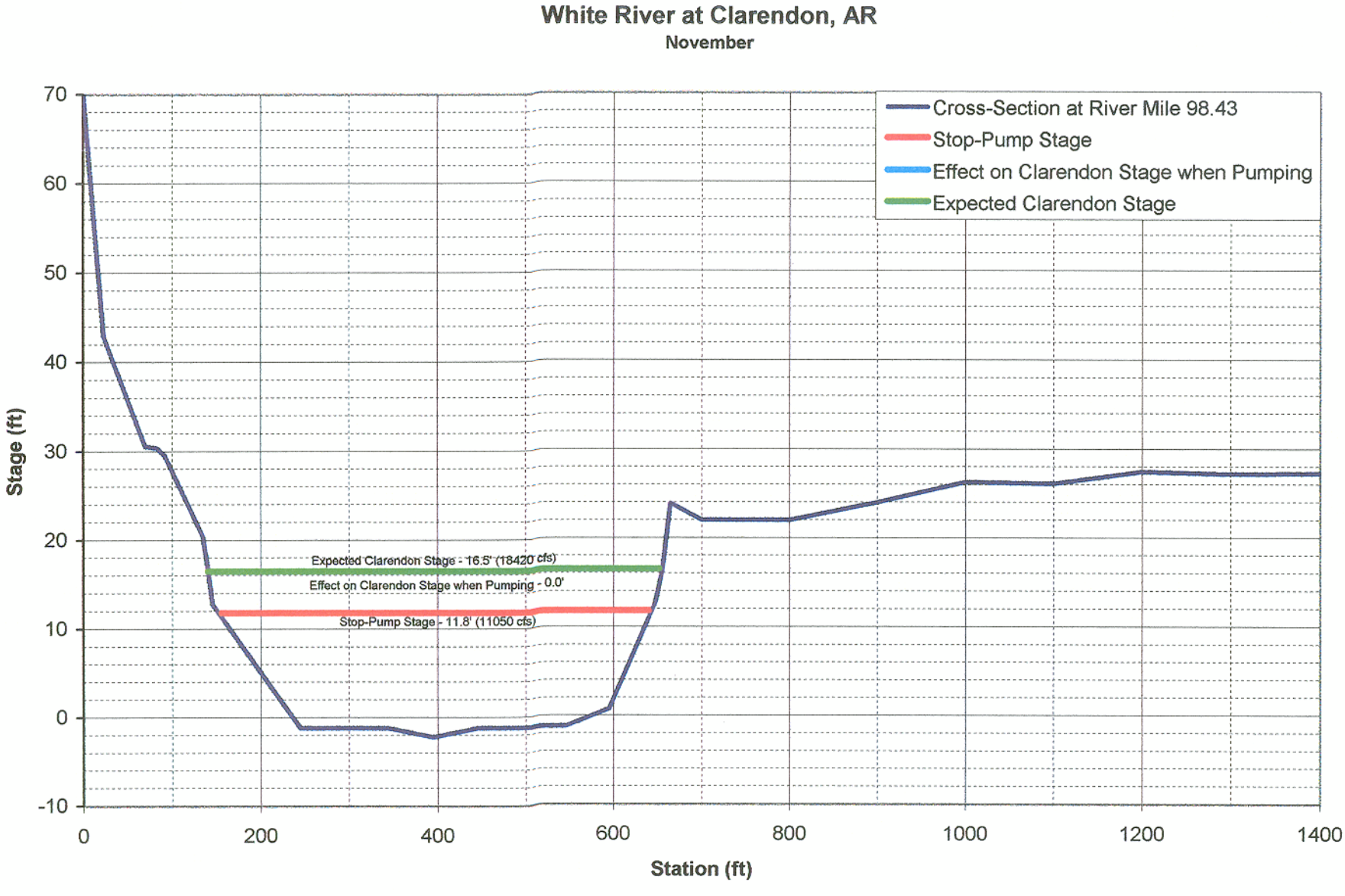

White River at Clarendon, AR
June
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 22.2' (30320 cfs)
Effect on Clarendon Stage when Pumping - 0.7'
Stop-Pump Stage - 18.0' (21220 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)

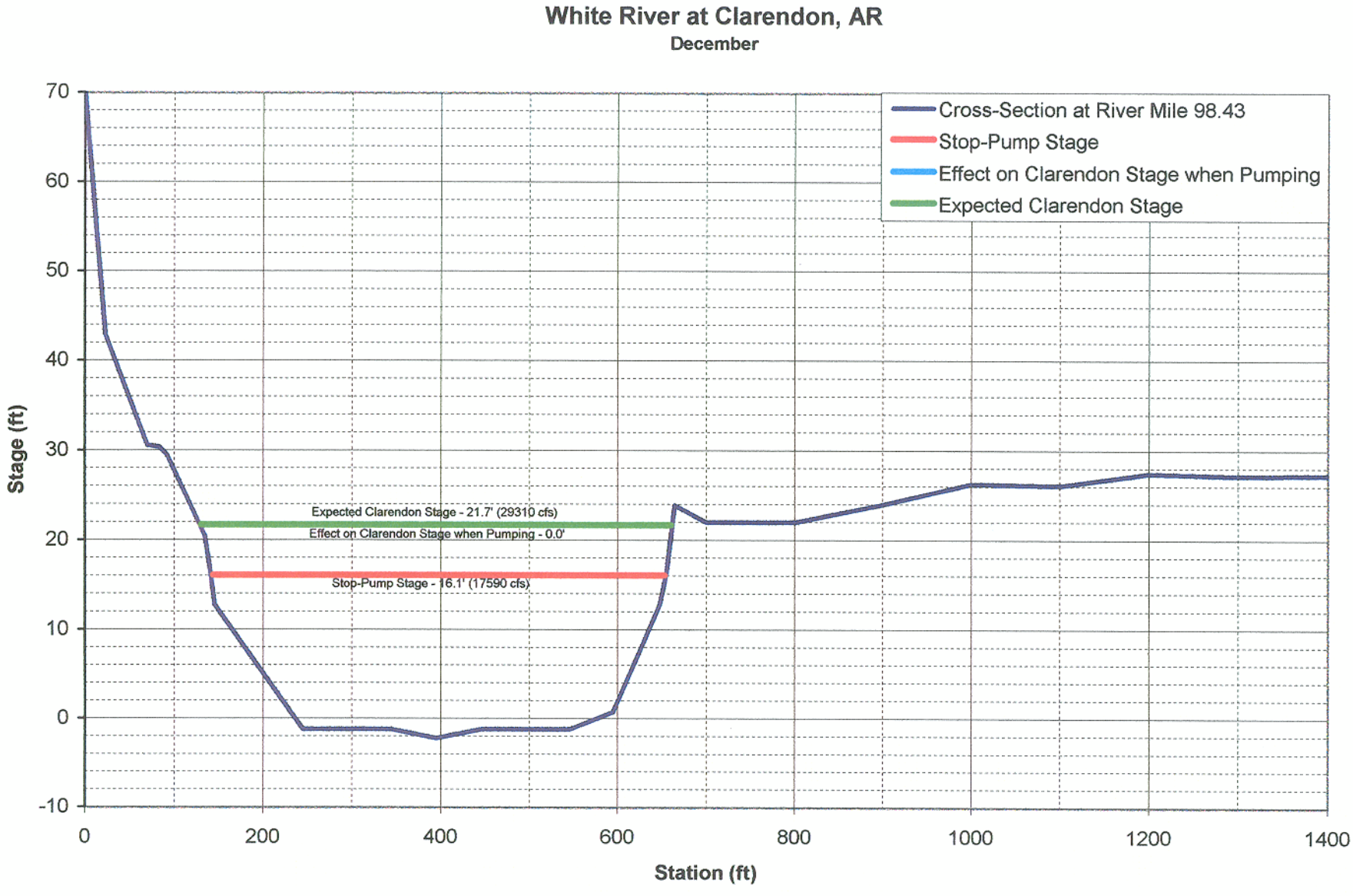

White River at Clarendon, AR
July
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 18.1' (21340 cfs)
Effect on Clarendon Stage when Pumping - 0.8'
Stop-Pump Stage - 11.5' (10670 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)


White River at Clarendon, AR
August
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 16.4' (18180 cfs)
Effect on Clarendon Stage when Pumping - 0.9'
Stop-Pump Stage - 10.8' (9650 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)


White River at Clarendon, AR
September
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 14.5' (15040 cfs)
Effect on Clarendon Stage when Pumping - 0.4'
Stop-Pump Stage - 10.8' (9650 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)


White River at Clarendon, AR
October
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 13.7' (13840 cfs)
Effect on Clarendon Stage when Pumping - 0.1'
Stop-Pump Stage - 11.8' (11050 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)


White River at Clarendon, AR
November
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 16.5' (18420 cfs)
Effect on Clarendon Stage when Pumping - 0.0'
Stop-Pump Stage - 11.8' (11050 cfs)
Stage (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400
Station (ft)


White River at Clarendon, AR
December
Cross-Section at River Mile 98.43
Stop-Pump Stage
Effect on Clarendon Stage when Pumping
Expected Clarendon Stage
Expected Clarendon Stage - 21.7' (29310 cfs)
Effect on Clarendon Stage when Pumping - 0.0'
Stop-Pump Stage - 16.1' (17590 cfs)
Stage (ft)
Station (ft)
70
60
50
40
30
20
10
0
-10
0
200
400
600
800
1000
1200
1400

Grand Prairie Area Demonstration Project
Environmental Summary
13 September 1999

Purpose - Provide a brief summary of environmental coordination, impacts, and benefits

Existing Conditions - The project area was historically tall grass prairie but because of its clay cap was uniquely suited for rice production. Only about 650 acres of native prairie remain of the original 500,000. A genetic study conducted by Southern Illinois University at Carbondale indicates that native prairie grasses are genetically different that commercially available cultivars. Approximately 17,400 acres of harvested crop fields are flooded each winter to provide a high quality food source for waterfowl. Stuttgart has become know as the rice and duck capitol of the world. The project area is underlain by a shallow (alluvial) aquifer and a deep (Sparta) aquifer. Both aquifers in the entire project area have been declared a critical ground water area by the state of Arkansas because of the severe ground water depletion. A large cone of depression in the alluvial aquifer is located under the Stuttgart area. The aquifers historically interacted with streams and wetlands in the area. Farmers are switching to surface water and have installed dams and pit reservoirs to irrigate from natural streams. Water levels in many streams are severely depleted during the irrigation season.

Future Without-Project Conditions - The alluvial aquifer will no longer be able to sustain irrigated agriculture by 2015. Rice production will drop to 23% of current levels and agriculture will switch to soybean production. The aquifer as a resource could sustain damage, a high quality food source (rice) for waterfowl will be lost, and the natural streams will continue to be depleted during the irrigation season. The aquifer's natural interaction with the wetlands and streams will be lost.

Environmental Coordination - A project team was established that included the U.S. Fish and Wildlife Service (USFWS), Natural Resources Conservation Service (NRCS), Arkansas Game and Fish Commission (AGFC), Arkansas Natural Heritage Commission (ANHC), and Arkansas Soil and Water Conservation Commission. This team participated in all aspects of project planning and were provided all project data. All study proposals were coordinated with these agencies, and study results were provided to them. A multi-agency team led by the ANHC and NRCS, with participation by the AGFC, USFWS, Corps, and Arkansas Highway and Transportation Department (AHTD), conducted a study that assessed potential impacts to White River floodplain wetlands. The USFWS conducted a mussel survey on tributary streams within the project area. A nationally recognized fisheries biologist from the U.S Army Waterways Experiment Station (WES) led the fisheries investigations.

Project Environmental Features -

- No land will be converted to cropland.
- Roll (to increase macroinvertebrate production and accelerate stubble decay)) and flood 38,529 acres of harvested rice fields for waterfowl.
- Provide fisheries in canals.

- Provide an additional 8,000 surface acres of reservoirs (these reservoirs will provide habitat for fish, shorebirds, and waterfowl).
- Construct weirs to maintain minimum water levels in tributary streams and prevent desiccation during the summer months.
- Plant prairie grasses on as much as 3,000 acres of canal right-of-way (seeds from native prairie grasses will be use to preserve genetic integrity).
- Preserve and sustain the aquifer.

Additional Environmental Features - A study to examine additional environmental features has been initiated. This study is focusing on additional measures for aquifer protection, waterfowl conservation, and wetland restoration (including wetland prairie restoration). The study is scheduled for completion in November 2000.

Potential Project Impacts - Scientific investigations were conducted on White River floodplain wetlands and on fisheries in the river as well as tributary streams. Potential impacts associated with withdrawals from the White River will occur downstream of DeVall's Bluff. The maximum impacts of the pumping station on White River stages will be about one foot at the lowest river stages before pump cutoff in the lowest possible pumping conditions. The impacts decrease at higher flows and cutoff levels and are essentially immeasurable at stages above bankfull. The impacts of these changes on both fish and wetlands were found to be minimal.

The operation of the pump station will be governed by the operations plan that will be referenced in the project cooperation agreement (PCA). The withdrawals must be limited to the withdrawals specified in the general reevaluation report. The withdrawals were based on the draft Arkansas State Water Management Plan for the White River, with varying withdrawals in different months. Environmental criteria were considered by the state, and the state will issue a permit for water withdrawal to the sponsor. Any change in the operation would require a supplement to the EIS.

Fisheries Impacts - **Dr. Jack Killgore (WES) led the fisheries studies. It was concluded that larval fish entrainment at the pump station should not negatively affect the White River fishery; however, larval fish entrainment will be monitored following project construction.** It was also determined that withdrawals from the river will not significantly impact littoral area habitat of fish and invertebrates. Four oxbow lakes were identified that could possibly have changes in connectivity with the river. The duration of the changes will be minor and were not considered significant, but a post-construction monitoring program for the lakes will be established.

Tributary Stream Impacts - **The project does not include any channel enlargements of tributary streams.** The project does use tributary streams to transport irrigation water and will place weirs in these streams. The location of the weirs will be determined with consideration given for sensitive environmental areas and plant communities. Currently, most tributary streams in the project area are used for irrigation; and water levels are greatly reduced during the summer months. The project will maintain

water in the tributary streams to the level of weirs. This will provide a significant increase in fish habitat.

Water Quality Impacts - The increased farm efficiencies include tail water recovery to capture and reuse irrigation water. **The farm runoff will decrease with the project.**

Mussels - **Malacologists, Dr. John Harris (AHTD), Dr. Paul Heartfield (USFWS), and Dr. Andrew Miller (WES) were consulted regarding potential impacts to mussels within the White River and the need for a quantitative impact study. It was concluded that the minor reductions in surface water elevations of the White River should not cause significant impacts to mussels and that no quantitative impact assessment was necessary.**

A major concern raised by natural resource agencies was the potential impact that zebra mussels (introduced from the White River) could have on native mussels in the tributary streams. A reconnaissance mussel survey of LaGrue Bayou was conducted by the USFWS in order to determine the need for more intensive surveys. The USFWS, led by Dr. Heartfield, conducted the reconnaissance survey on LaGrue Bayou because it was thought to be the stream most likely to contain at least a moderate mussel population. However, the survey revealed only low-density mussel populations. The USFWS attributed the scarcity of mussels to channel modification, agricultural runoff, and irrigation withdrawals. Based on the reconnaissance survey, the USFWS informed the Corps that more intensive surveys were not needed. Moreover, if zebra mussels proliferate in the White River, their introduction into the smaller tributary streams is likely inevitable, with or without the project.

Wetland Impacts - **A scientific investigation, led by the ANHC and NRCS, was conducted to determine the impacts on White River wetlands.** The White River is controlled by a series of reservoirs. The reservoirs provide more stable flow conditions and much higher than natural or pre-dam flows in the summer months. **The investigations concluded that the effects would be to move the river conditions to slightly more natural or historical conditions.**

Waterfowl Impacts - **Since the effect of the pumping station would be essentially immeasurable during flooding conditions on the White River, the project would have no impacts on the area or duration of the floods used by waterfowl.** The project would provide significantly more waterfowl habitat in the Grand Prairie and reliably provide this habitat sooner in the waterfowl season. Without the project, much of the flooded rice fields currently used by waterfowl in the Grand Prairie would be lost.

Cumulative Impacts - The final environmental impact statement assesses the cumulative impacts of other potential projects in the White River basin. The other irrigation projects that would rely on the White River are neither authorized nor funded for study. The Grand Prairie Project has minimal impacts and significant environmental benefits, and it is needed now to save the aquifer. Waiting to initiate construction would

place the start of project operation dangerously close to the predicted depletion of the aquifer in 2015.

Mitigation - Canal and pipeline alignments were determined considering environmental impacts. **Unavoidable impacts will be fully mitigated.** The mitigation includes not only wetlands mitigation but also mitigation for upland hardwoods. The mitigation necessary for on-farm features was also estimated and will be included with project mitigation in manageable blocks.

Benefits -

Aquifer Protection Benefits - The project will provide the water necessary to save the aquifers (both alluvial and Sparta). Without the project, the aquifers will be depleted.

Fishery Benefits - The new irrigation canals and reservoirs will provide additional fisheries to the project area. The pooling effect of weirs and maintenance of year-round minimum water levels will improve the quality of habitat in tributary streams.

Waterfowl Flooding in the Grand Prairie - The goals of the waterfowl plan were established with assistance from waterfowl biologists with the AGFC and the USFWS. The flooding will be part of the operation plan for the PCA and the on-farm plans for the individuals. The White River Irrigation District requested that waterfowl conservation be made part of the authorized project.

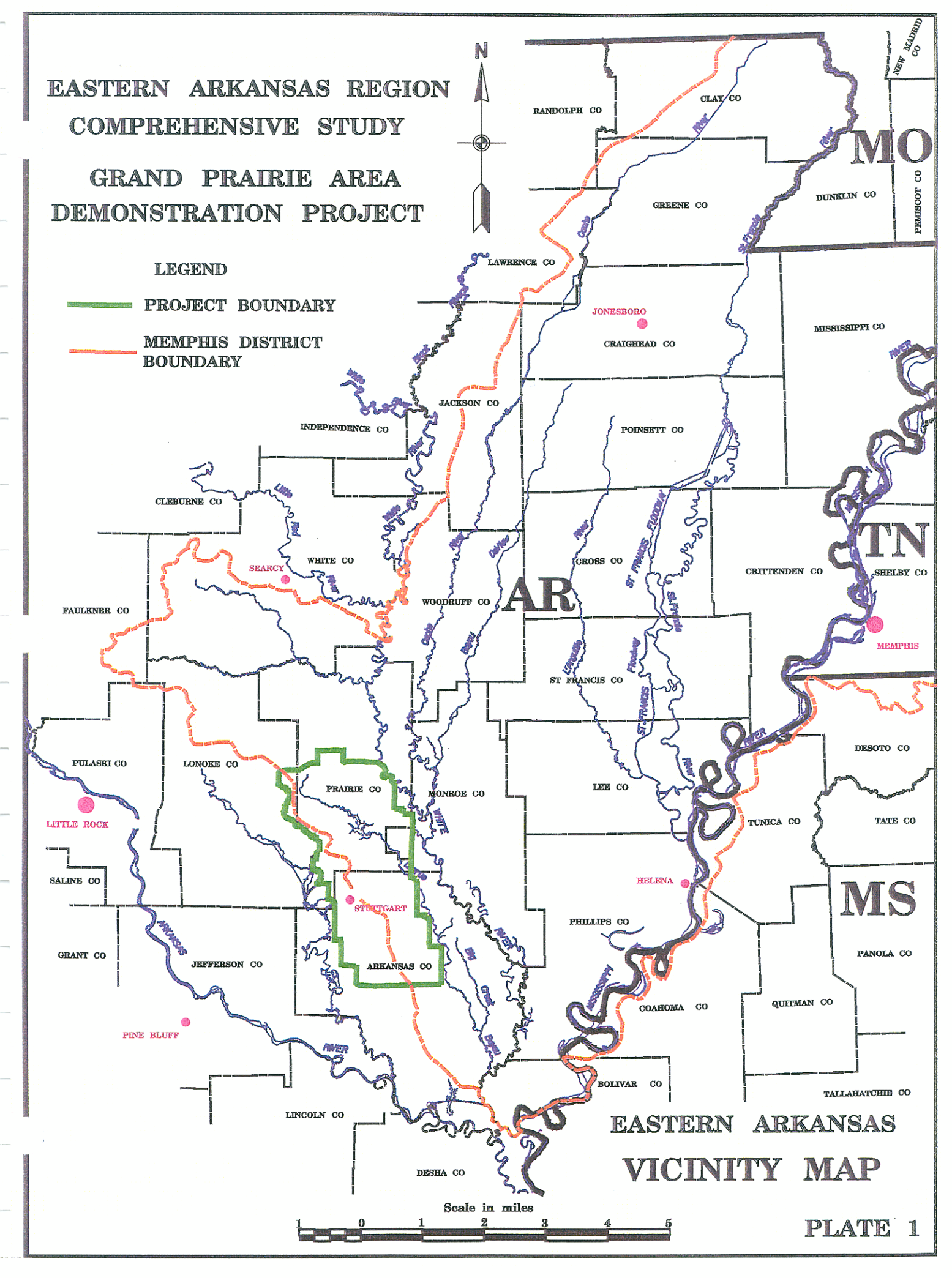
Prairie Grass Restoration - The prairie grasses will not be planted in a large contiguous block. However, the native genotypes will be preserved and expanded to up to five times their current area. Much publicity has been given to the railroad prairie, a strip of prairie along an abandoned railroad. Like the railroad prairie, prairie restoration areas will be linearly configured. These strips of prairie should still restore much-needed habitat for certain prairie wildlife species. Additionally, the on-going prairie grass research should enhance the chances for successful establishment of prairie grasses; this could, in turn, encourage the planting of native prairie grasses by others in similar situations.

Significant Resources

- It is unlikely that water withdrawals associated with this project could adversely impact White River floodplain wetlands. Moreover, the drying up (desiccation) of groundwater wetlands along portions of the White River could possibly be halted or slowed by implementing this project.
- It is unlikely that water withdrawals associated with this plan could adversely impact bottomland hardwoods along the White River. Furthermore, the project could slow or prevent desiccation of botttomland hardwoods along the White River that are influenced by groundwater.
- No significant impacts to upland hardwoods are anticipated.
- This project would provide an additional source of irrigation water. At year 2015 and beyond, annual aquifer withdrawals would be limited to the long-term sustained yield (35,574 acre-feet) which would allow the aquifer to recharge.
- This project should not induce any significant sedimentation in tributary streams. The use of White River water for irrigation purposes should have positive effects on farmland and tributaries.
- Impacts to the White River fishery as a result of pump entrainment and reductions in surface water elevations are projected to be relatively minor. The minor changes in river surface water elevations should not impact mussels. Overall, Mussels in the tributary streams should benefit from this plan.
- This project could increase the amount of prairie vegetation by establishing it in canal rights-of-way.
- Habitat losses would be offset by the acquisition and reforestation of 436 acres of cleared land. Flooding 38,529 acres of harvested rice fields on an average annual basis would provide additional 12,275,949 duck-use-days (DUDs) per year. Drying of wetlands along the river could be halted or slowed, benefiting certain wildlife species.
- No people will be displaced if this project is implemented. In fact, the area's income would be greatly enhanced over the levels expected without the project which would prevent the loss of area employment.
- This project would significantly reduce or halt the erosion of property values and tax base.
- This project would maintain the area's agricultural and agricultural related production, farms and businesses, income, employment, tax base, public services, and urban and rural population necessary to maintain the area's economy at present levels.

EASTERN ARKANSAS REGION COMPREHENSIVE STUDY

GRAND PRAIRIE AREA DEMONSTRATION PROJECT



EASTERN ARKANSAS VICINITY MAP

PLATE 1